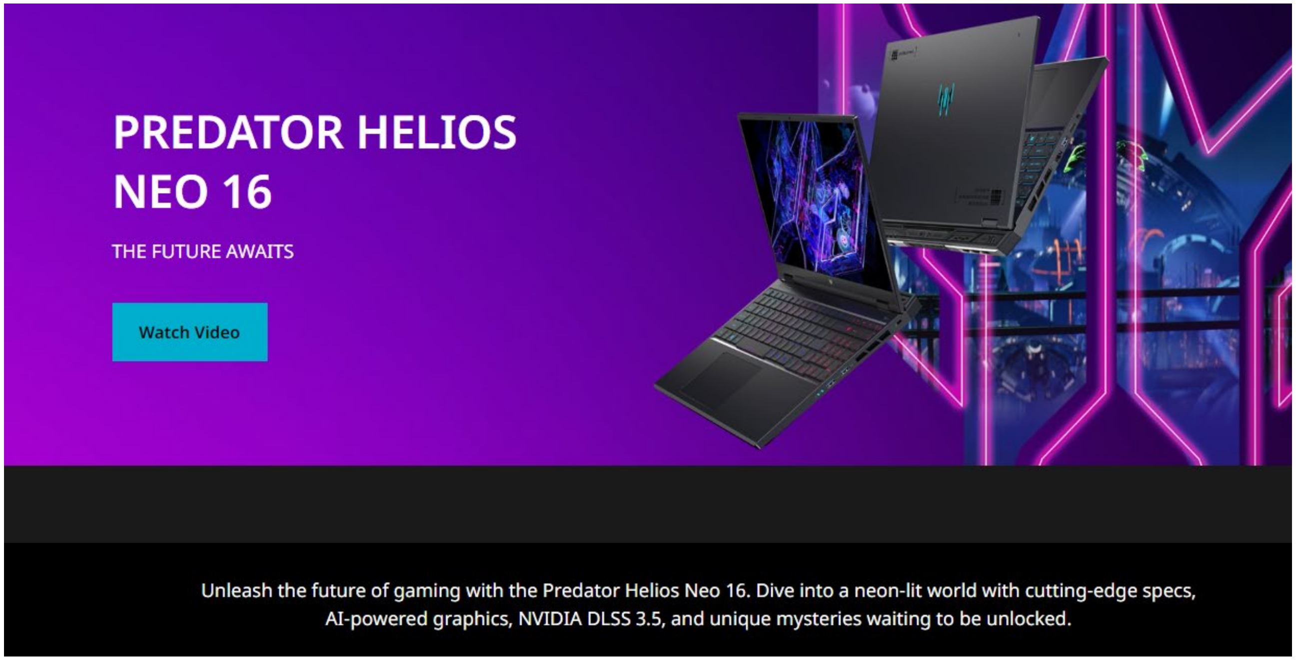
Exhibit 8: U.S. Patent No. 9,179,147

Claims	Identification
10[pre] A video encoder for encoding a video by obtaining an optimal sequence of quantized coefficients for a block of transform residuals from the video, the video encoder comprising:	To the extent the preamble is limiting, Acer-branded devices implement a video encoder for encoding a video by obtaining an optimal sequence of quantized coefficients for a block of transform residuals from the video.  Source: https://www.acer.com/us-en/predator/laptops/helios/helios-neo-16#filterHeader

Claims	Identification

Processor

Processor Manufacturer	Intel®
Processor Type	Core™ i7
Processor Model	i7-14650HX
Processor Core	Hexadeca-core (16 Core™)
Processor Generation	14th Gen

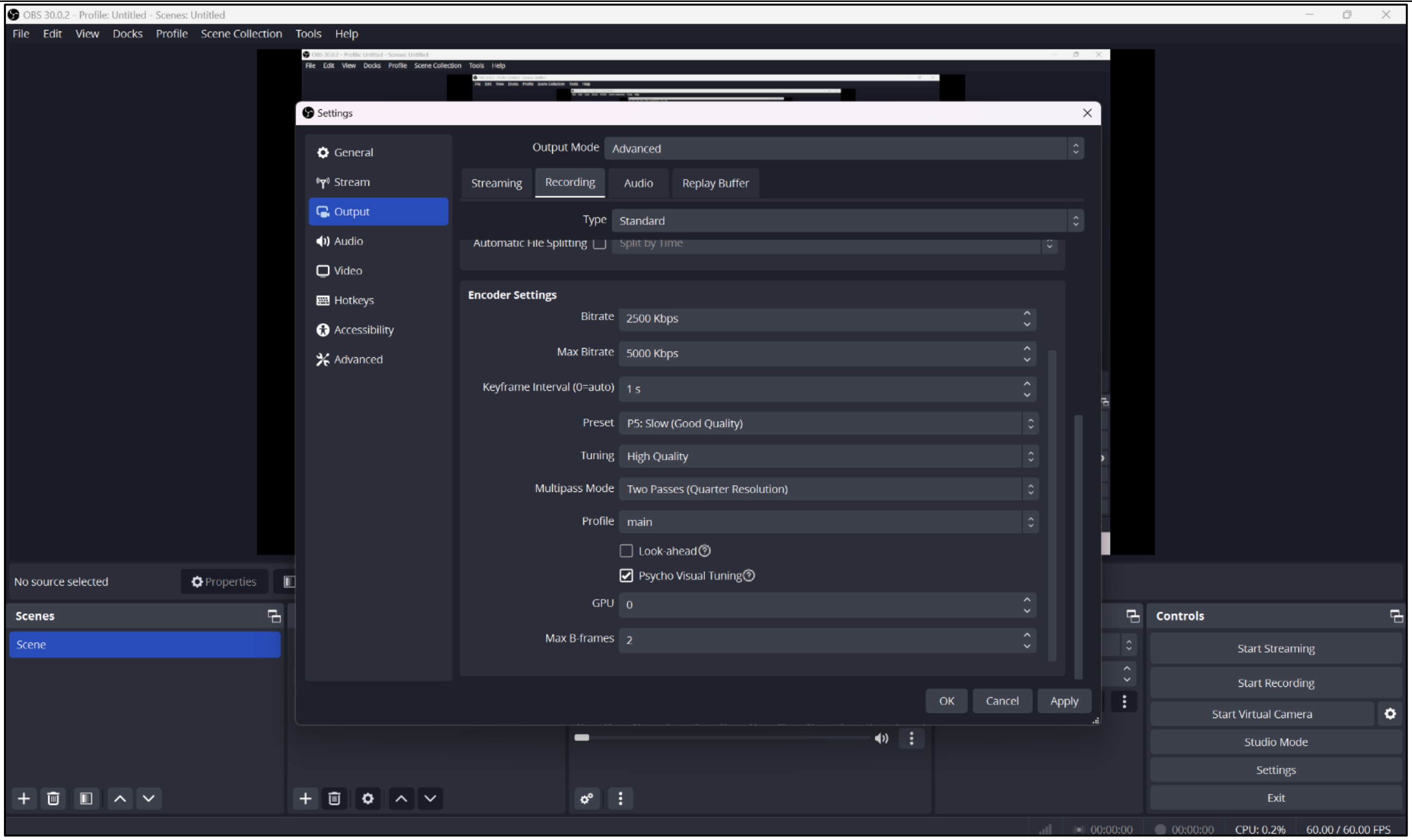
Display & Graphics

Graphics Controller Manufacturer	NVIDIA®
Graphics Controller Model	GeForce RTX™ 4060
Graphics Memory Capacity	8 GB
Graphics Memory Technology	GDDR6
Graphics Memory Accessibility	Dedicated
GPU Boost Clock	Up to 2350 MHz
Maximum Graphics Power	Up to 140 W
Screen Size	16"
Display Screen Type	LCD
Display Screen Technology	ComfyView (Matte) In-plane Switching (IPS) Technology
Touchscreen	No
Screen Resolution	1920 x 1200
Standard Refresh Rate	165 Hz
Display Features	100% sRGB Color Gamut
Aspect Ratio	16:10

Memory

Total Installed System Memory	16 GB
System Memory Technology	DDR5 SDRAM
Memory Card Reader	Yes
Memory Card Supported	microSD

Source: https://www.acer.com/us-en/predator/laptops/helios/helios-neo-16/pdp/NH.QQXAA.001

Claims	Identification
	 Source: Internal Testing of Acer Predator Helios Neo 16 Gaming Laptop.

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	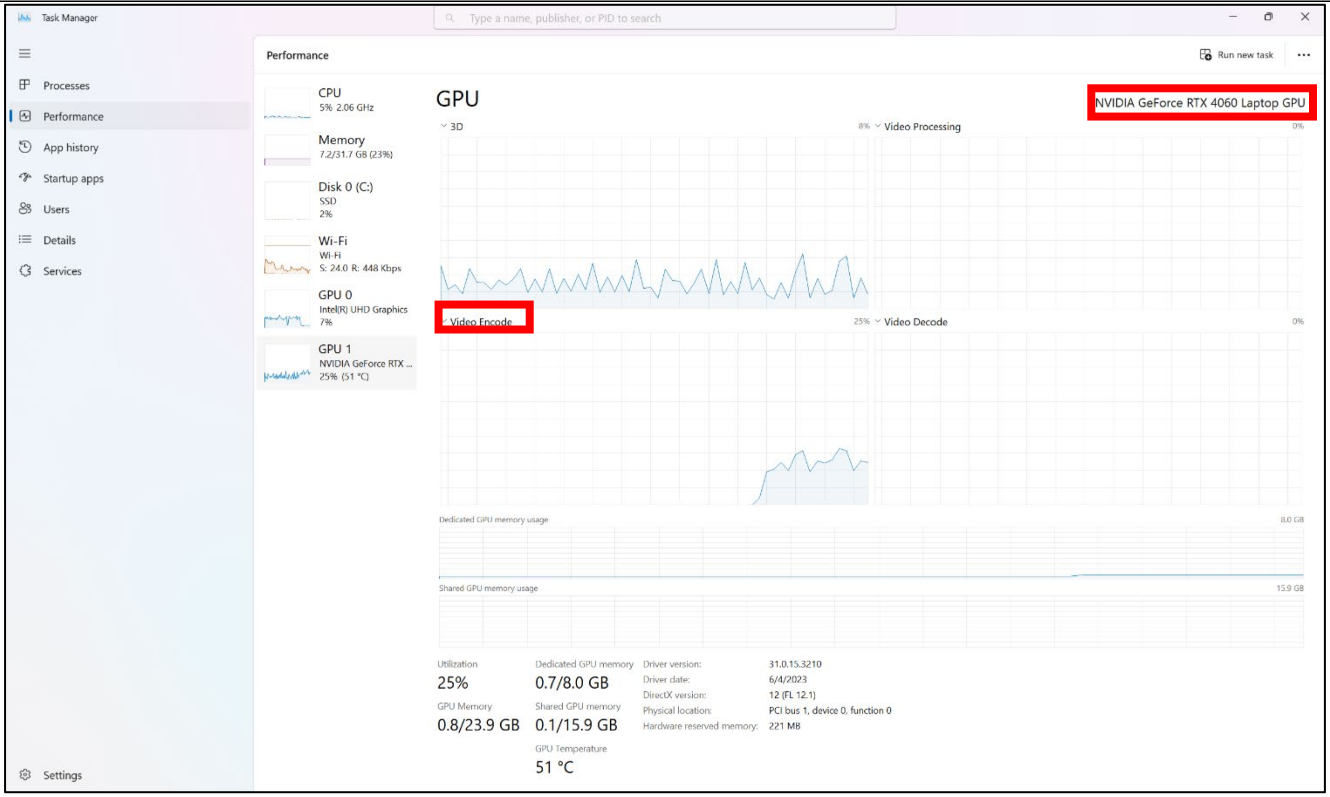 Source: Internal Testing of Acer Predator Helios Neo 16 Gaming Laptop.

Claims	Identification
	Joint Collaborative Team on Video Coding (JCT-VC) **of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11** Document: JCTVC-Software Manual *Title:* HM Software Manual *Status:* Software AHG working document *Purpose:* Information *Author(s):* Frank Bossen *frank@bossentech.com* David Flynn *dflynn@blackberry.com* Karl Sharman *karl.sharman@eu.sony.com* Karsten Sühring *karsten.suehring@hhi.fraunhofer.de* *Source:* AHG chairs **Abstract** This document is a user manual describing usage of reference software for the HEVC project. It applies to version 16.8 of the software. **Contents** **1 General Information** **2** **2 Installation and compilation** **2** **3 Using the encoder** **3** 3.1 GOP structure table . . . . . 3 3.2 Encoder parameters . . . . . 7 3.3 Encoder SEI parameters . . . . . 19 3.4 Hardcoded encoder parameters . . . . . 27 Source: HEVC Encoder Manual (https://github.com/listenlink/HM/blob/master/doc/software-manual.pdf), 1

Claims	Identification
	Table 9: Quantization parameters Option | Default | Description QP (-q) | 30.0 | Specifies the base value of the quantization parameter. If it is non-integer, the QP is switched once during encoding. CbQpOffset (-cbqpofs) | 0 | Global offset to apply to the luma QP to derive the QP of Cb and Cr respectively. These options correspond to the values of cb_qp_offset and cr_qp_offset, that are transmitted in the PPS. Valid values are in the range $[-12, 12]$. CrQpOffset (-crqpofs) | 0 | MaxCuDQPDepth (-dqd) | 0 | Defines maximum depth of a minimum CuDQP for sub-LCU-level delta QP. MaxCuDQPDepth shall be greater than or equal to SliceGranularity. RDOQ | true | Enables or disables rate-distortion-optimized quantization for transformed TUs. RDOQTS | true | Enables or disables rate-distortion-optimized quantization for transform-skipped TUs. SelectiveRDOQ | false | Enables or disables selective rate-distortion-optimized quantization. A simple quantization is use to pre-analyze, whether to bypass the RDOQ process or not. If all the coefficients are quantized to 0, the RDOQ process is bypassed. Otherwise, the RDOQ process is performed as usual. Source: HEVC Encoder Manual, 12 *A. Quantization of transform coefficients* In this stage the encoder performs calculation for each of transform coefficients separately. In the first step, the encoder calculates the value *Level* by quantizing the magnitude of transform coefficient by using the uniform quantizer without dead zone. In the next step, the encoder considers two additional magnitudes of the analyzed quantized coefficient: *Level-1* and *0*. For every of the mentioned coefficient magnitudes, the encoder calculates the RD cost of encoding the coefficient with the selected magnitude and chooses the one with the lowest RD cost.

Claims	Identification
	Source: Rate-distortion optimized quantization in HEVC: Performance Limitations (https://www.researchgate.net/publication/279183792_Rate-distortion_optimized_quantization_in_HEVC_Performance_limitations), 3.
10[a] a processor;	Acer-branded devices implement a video encoder comprising a processor.

Processor

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Graphics Memory Technology	GDDR6
Graphics Memory Accessibility	Dedicated
GPU Boost Clock	Up to 2350 MHz
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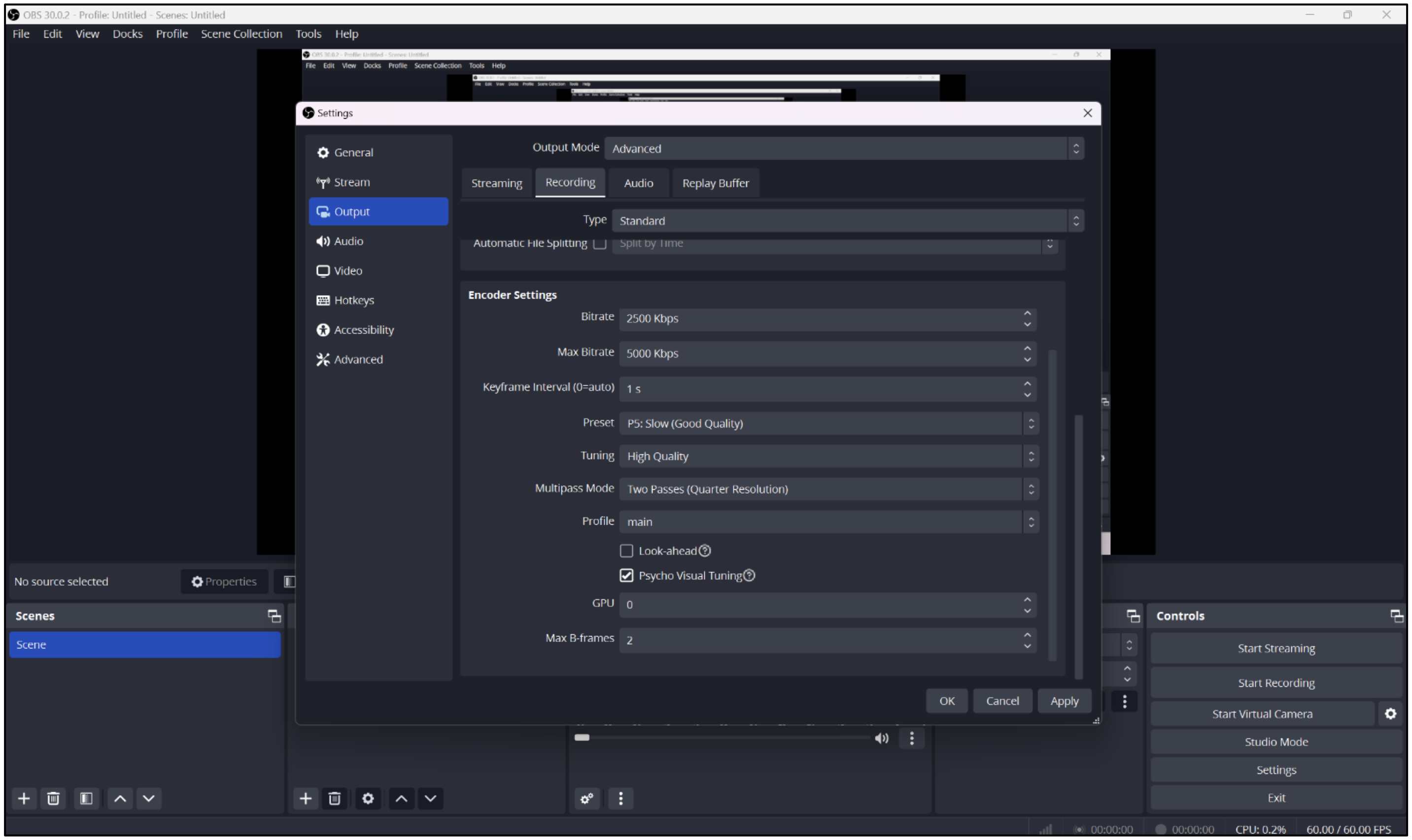
Screen Size	16"
Display Screen Type	LCD
Display Screen Technology	ComfyView (Matte) In-plane Switching (IPS) Technology
Touchscreen	No
Screen Resolution	1920 x 1200
Standard Refresh Rate	165 Hz
Display Features	100% sRGB Color Gamut
Aspect Ratio	16:10

Memory

Total Installed System Memory	16 GB
System Memory Technology	DDR5 SDRAM
Memory Card Reader	Yes
Memory Card Supported	microSD

Source: https://www.acer.com/us-en/predator/laptops/helios/helios-neo-16/pdp/NH.QQXAA.001

<table>
<tr><th>Claims</th><th>Identification</th></tr>
<tr><td></td><td>

Source: Internal Testing of Acer Predator Helios Neo 16 Gaming Laptop.</td></tr>
<tr><td>10[b] memory;</td><td>Acer-branded devices implement a video encoder comprising a memory.</td></tr>
</table>

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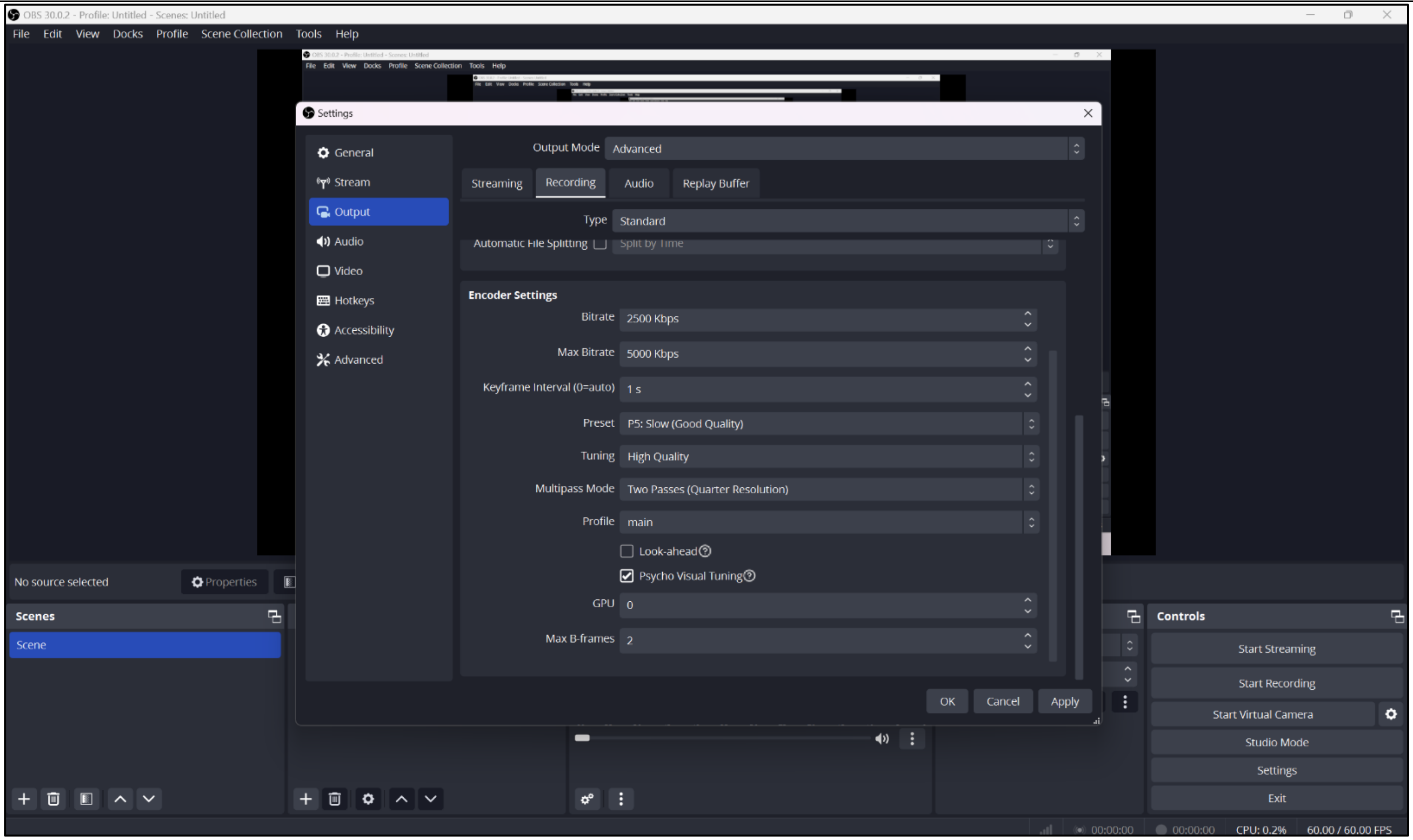
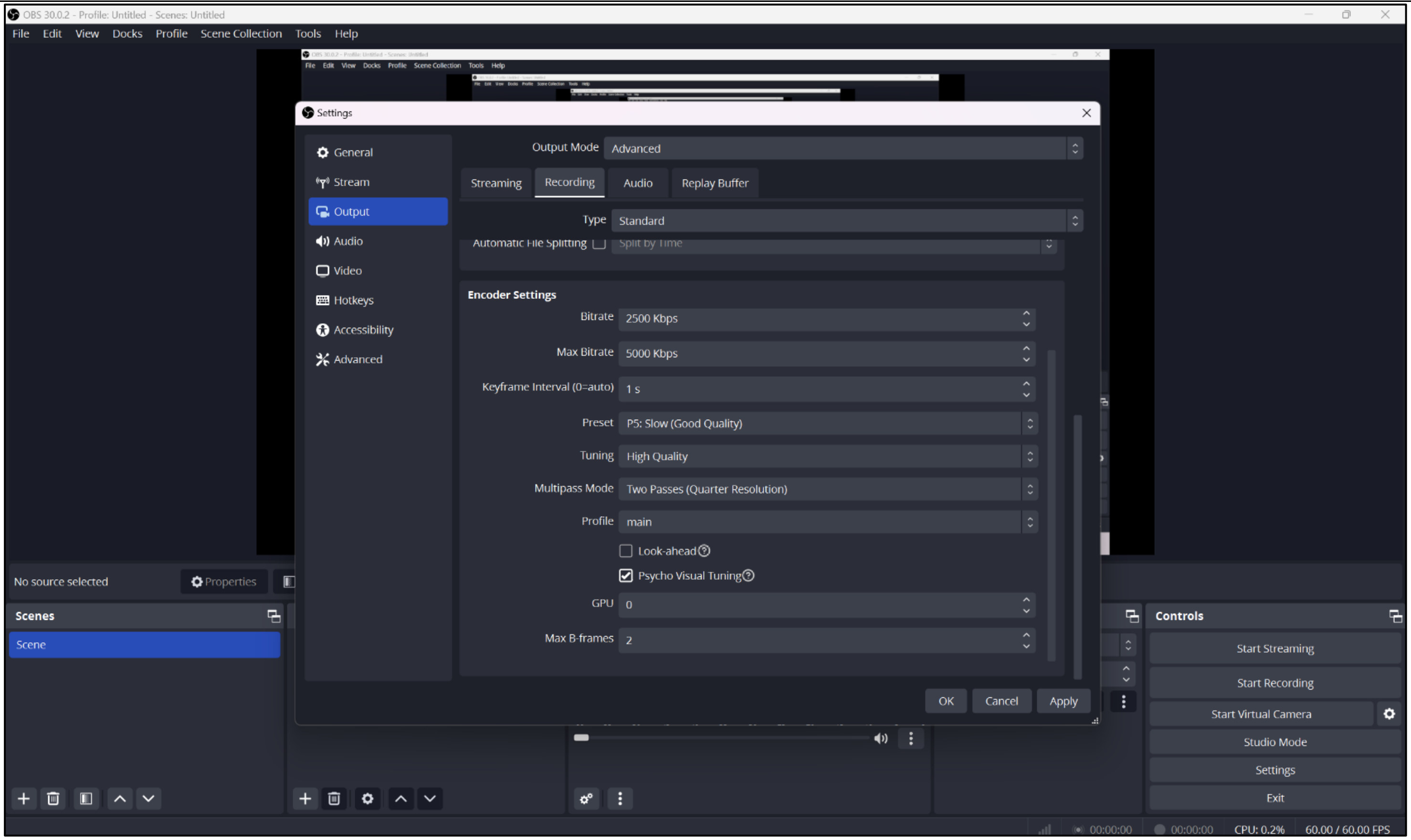
	 Source: Internal Testing of Acer Predator Helios Neo 16 Gaming Laptop.
10[c] a video encoding application executable by the processor and which, when executed, configures the processor to:	Acer-branded devices implement a video encoder that comprises a video encoding application executable by the processor.

Claims	Identification
	 Source: Internal Testing of Acer Predator Helios Neo 16 Gaming Laptop.

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	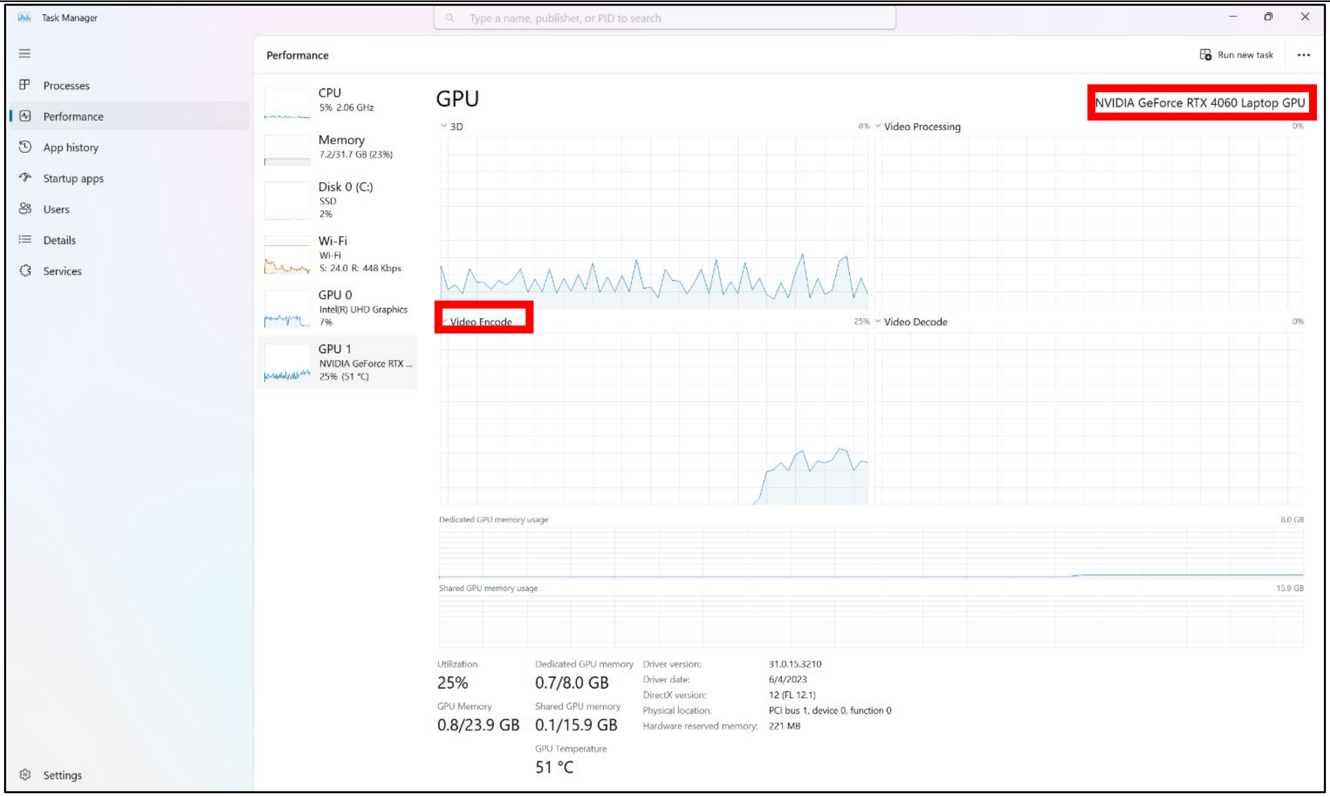 Source: Internal Testing of Acer Predator Helios Neo 16 Gaming Laptop.
10[d] obtain a sequence of quantized coefficients for the block of transform residuals;	Acer-branded devices implement a video encoder that comprises a video encoding application executable by the processor and which, when executed, configures the processor to obtain a sequence of quantized coefficients for the block of transform residuals. IV. THE RDOQ IN HEVC The RDOQ has been included in the HEVC reference software (HM) and intensively used during HEVC development and performance. This section describes the RDOQ algorithm adapted to HEVC.

Claims	Identification
	Source: Rate-distortion optimized quantization in HEVC: Performance Limitations, 3. *A. Quantization of transform coefficients* In this stage the encoder performs calculation for each of transform coefficients separately. In the first step, the encoder calculates the value *Level* by quantizing the magnitude of transform coefficient by using the uniform quantizer without dead zone. In the next step, the encoder considers two additional magnitudes of the analyzed quantized coefficient: *Level-1* and *0*. For every of the mentioned coefficient magnitudes, the encoder calculates the RD cost of encoding the coefficient with the selected magnitude and chooses the one with the lowest RD cost. Source: Rate-distortion optimized quantization in HEVC: Performance Limitations, 3.
10[e] calculate, for the obtained sequence, a rate-distortion cost based on a distortion cost and on a rate cost based on a context-adaptive entropy encoder, wherein the context-adaptive entropy encoder encodes each quantized coefficient by selecting at least one context from a plurality of contexts by determining an index for a set of contexts based, at least in part, on a previous quantized coefficient in	Acer-branded devices implement a video encoder that comprises a video encoding application executable by the processor and which, when executed, configures the processor to calculate, for the obtained sequence, a rate-distortion cost based on a distortion cost and on a rate cost based on a context-adaptive entropy encoder, wherein the context-adaptive entropy encoder encodes each quantized coefficient by selecting at least one context from a plurality of contexts by determining an index for a set of contexts based, at least in part, on a previous quantized coefficient in the sequence of quantized coefficients.

Claims	Identification
the sequence of quantized coefficients; and	V. THE SIMPLIFIED RDOQ IN HEVC REFERENCE SOFTWARE In the RDOQ implemented HEVC test model (HM16) [20] the encoder uses only estimated values of introduced distortion (represented by square quantization error) and a number of bits required to encode selected transform coefficient, coefficient group or transform unit. For example, for every of the examined coefficient magnitude the encoder calculates the cost RD_cost(L, c) of encoding the coefficient c with the magnitude L according to (2) and chooses the case with the lowest RD cost. $RD\_cost\ (L, c) = est\_D(L, c) + \lambda \cdot est\_B(L, c),\qquad (2)$ where: c – transform coefficient identifier, L – value of quantized transform coefficient c, $RD\_cost(L, c)$ – cost of quantization coefficient c to value L, $est\_D(L, c)$ – square quantization error, $est\_B(L, c)$ – estimated number of bits needed do encode coefficient c quantized to value L, λ – Lagrange multiplier. The detailed description of RDOQ implementation in HEVC can be found in [21]. Source: Rate-distortion optimized quantization in HEVC: Performance Limitations, 4.

Claims	Identification
	4 Abbreviations and acronyms For the purposes of this Recommendation | International Standard, the following abbreviations and acronyms apply: ATSC Advanced Television Systems Committee B Bi-predictive BLA Broken Link Access BPB Bitstream Partition Buffer CABAC Context-based Adaptive Binary Arithmetic Coding HEVC Specification (H.265), 14. **9.3 CABAC parsing process for slice segment data** **9.3.1 General** This process is invoked when parsing syntax elements with descriptor ae(v) in clauses 7.3.8.1 through 7.3.8.12. Inputs to this process are a request for a value of a syntax element and values of prior parsed syntax elements. Output of this process is the value of the syntax element. The initialization process as specified in clause 9.3.2 is invoked when starting the parsing of one or more of the following: 1. the slice segment data syntax specified in clause 7.3.8.1, 2. the CTU syntax specified in clause 7.3.8.2 and the CTU is the first CTU in a tile, 3. the CTU syntax specified in clause 7.3.8.2, entropy_coding_sync_enabled_flag is equal to 1 and the associated luma CTB is the first luma CTB in a CTU row of a tile. The parsing of syntax elements proceeds as follows: When cabac_bypass_alignment_enabled_flag is equal to 1, the request for a value of a syntax element is for either the syntax elements coeff_abs_level_remaining[ ] or coeff_sign_flag[ ] and escapeDataPresent is equal to 1, the alignment process prior to aligned bypass decoding as specified in clause 9.3.4.3.6 is invoked. Source: HEVC Specification (H.265), 203.

<table>
<tr><th>Claims</th><th>Identification</th></tr>
<tr><td></td><td>

The basic design of CABAC involves the key elements of binarization, context modeling, and binary arithmetic coding. These elements are illustrated as the main algorithmic building blocks of the CABAC encoding block diagram in Fig. 1. Binarization maps the syntax elements to binary symbols (bins). Context modeling estimates the probability of each non-bypassed (i.e., regular coded) bin based on some specific context. Finally, binary arithmetic coding compresses the bins to bits according to the estimated probability.

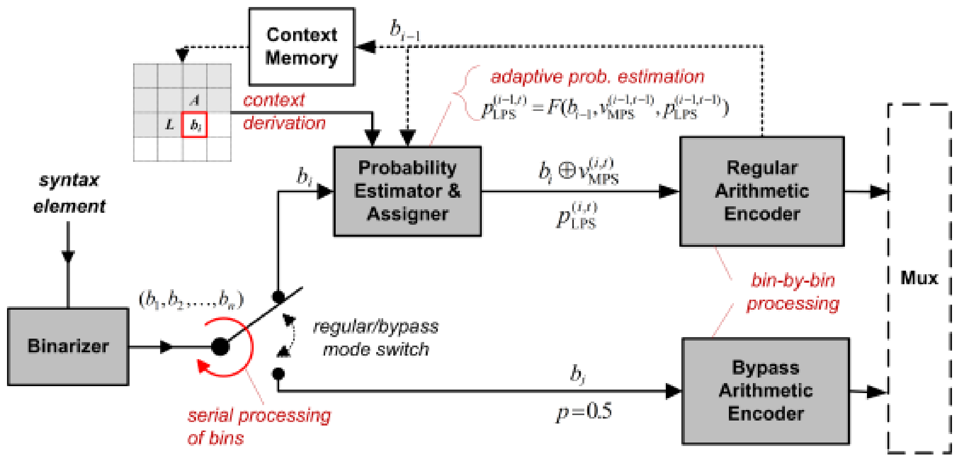

Fig. 1: CABAC block diagram (from the encoder perspective): Binarization, context modeling (including probability estimation and assignment), and binary arithmetic coding. In red: Potential throughput bottlenecks, as further discussed from the decoder perspective in Sect. 3.2.

Source: Entropy Coding in HEVC, 4.

</td></tr>
</table>

<table>
<tr><th>Claims</th><th>Identification</th></tr>
<tr><td></td><td>2.2 Context Modeling, Probability Estimation and Assignment

By decomposing each non-binary syntax element value into a sequence of bins, further processing of each bin value in CABAC depends on the associated coding-mode decision, which can be either chosen as the regular or the bypass mode (as described in Sect. 2.3). The latter is chosen for bins, which are assumed to be uniformly distributed and for which, consequently, the whole regular binary arithmetic encoding (and decoding) process is simply bypassed. In the regular coding mode, each bin value is encoded by using the regular binary arithmetic coding engine, where the associated probability model is either determined by a fixed choice, based on the type of syntax element and the bin position or bin index (binIdx) in the binarized representation of the syntax element, or adaptively chosen from two or more probability models depending on the related side information (e.g. spatial neighbors as illustrated in Fig. 1, component, depth or size of CU/PU/TU, or position within TU). Selection of the probability model is referred to as context modeling. As an important design decision, the latter case is generally applied to the most frequently observed bins only, whereas the other, usually less frequently observed bins, will be treated using a joint, typically zero-order probability model. In this way, CABAC enables selective adaptive probability modeling on a sub-symbol level, and hence,
Source: Entropy Coding in HEVC, 6.</td></tr>
<tr><td>10[f] change a value of one of said quantized coefficients of the obtained sequence to produce a new sequence of quantized coefficients, so that a resulting rate-distortion cost for the new sequence of quantized coefficients is smaller than a rate-distortion cost for the obtained sequence.</td><td>Acer-branded devices implement a video encoder that comprises a video encoding application executable by the processor and which, when executed, configures the processor to change a value of one of said quantized coefficients of the obtained sequence to produce a new sequence of quantized coefficients, so that a resulting rate-distortion cost for the new sequence of quantized coefficients is smaller than a rate-distortion cost for the obtained sequence.</td></tr>
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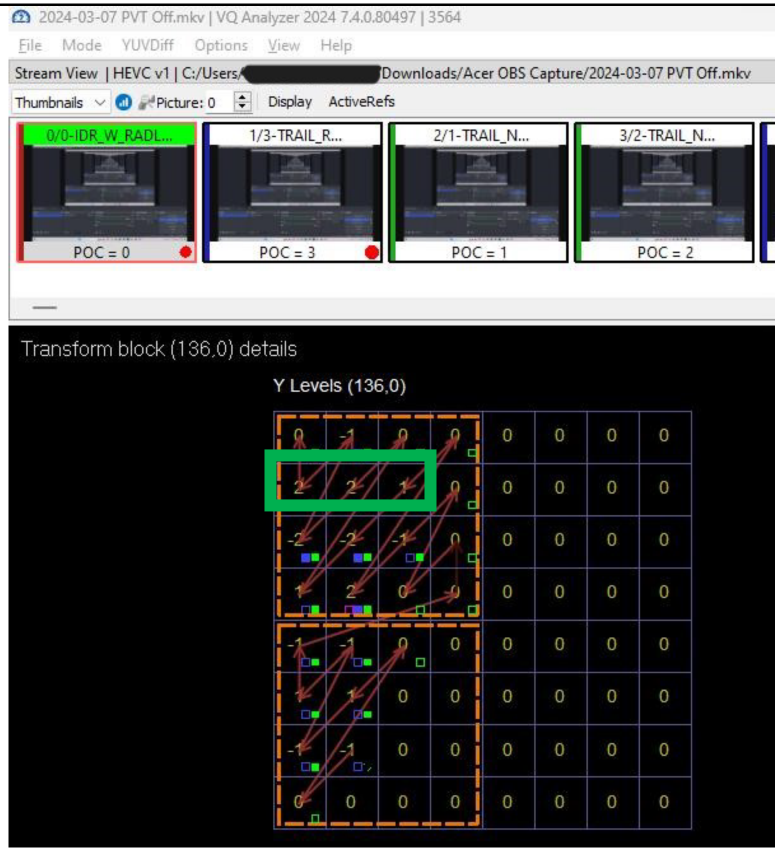
Claims	Identification
	IV. THE RDOQ IN HEVC The RDOQ has been included in the HEVC reference software (HM) and intensively used during HEVC development and performance. This section describes the RDOQ algorithm adapted to HEVC. ... *A. Quantization of transform coefficients* In this stage the encoder performs calculation for each of transform coefficients separately. In the first step, the encoder calculates the value *Level* by quantizing the magnitude of transform coefficient by using the uniform quantizer without dead zone. In the next step, the encoder considers two additional magnitudes of the analyzed quantized coefficient: *Level-1* and *0*. For every of the mentioned coefficient magnitudes, the encoder calculates the RD cost of encoding the coefficient with the selected magnitude and chooses the one with the lowest RD cost. Source: Rate-distortion optimized quantization in HEVC: Performance Limitations, 3. Acer-branded devices perform rate-distortion optimization. For example, the following depicts video frames with Psycho Visual tuning disabled (on the left) and Psycho Visual tuning enabled to enable rate-distortion optimization (on the right).

Claims	Identification



Quantized coefficients for HEVC encoded video with Psycho Visual tuning disabled

Quantized coefficients for HEVC encoded video with Psycho Visual tuning enabled (to enable rate-distortion optimization)

Source: Internal Testing of Acer Predator Helios Neo 16 Gaming Laptop.

After enabling the psycho-visual setting (to enable rate-distortion optimization), the magnitude of the quantized coefficient for some of the coefficients is decreased by 1 and/or reduced to 0. *Compare* the quantized coefficients in the green box with the quantized coefficients in the red box.

The change in magnitude of the quantized coefficients when Psycho Visual Tuning is enabled indicates rate-distortion optimization.